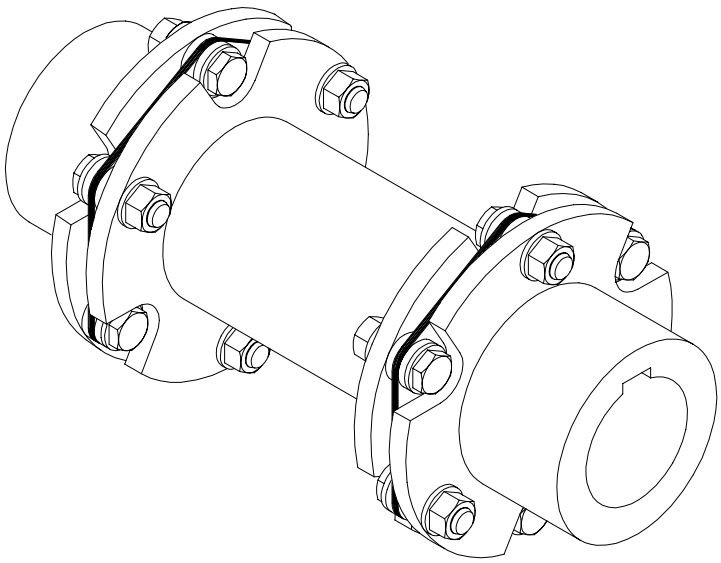
Operating Instructions

BA 8701 EN 08.03

for **ARPEX®** All Steel Couplings of all types
Series **ARS-6**
Sizes 78 to 722



FLENDER

A. Friedr. Flender GmbH · 46393 Bocholt · Tel. 02871/92-0 · Telefax 02871/92-2596 · http://www.flender.com

Manufacturer´s Declaration

according to the meaning of the EU directive 98/37/EC appendix II B

Herewith we declare, that the

ARPEX All Steel Couplings,
Series ARS-6, Sizes 78 - 722

described in these operating instructions, are intended for incorporation into a machine and that their use is prohibited until it has been established that the machine , into which these components have been incorporated, corresponds with the EU directive (original version 98/37/EC incl. further amendments).

With this manufacturer‘s declaration, all coordinated standards are taken into account, in as far as they apply to our products, which are published by the EU commission in the gazette of the European Union.

Bocholt, 01.08.2003

Signature (Engineering)

Contents

1. Technical data

The following lists of technical data contain the most important details of the coupling. These data and the contractual agreement for the coupling determine the limits of its use according to the terms of the contract.

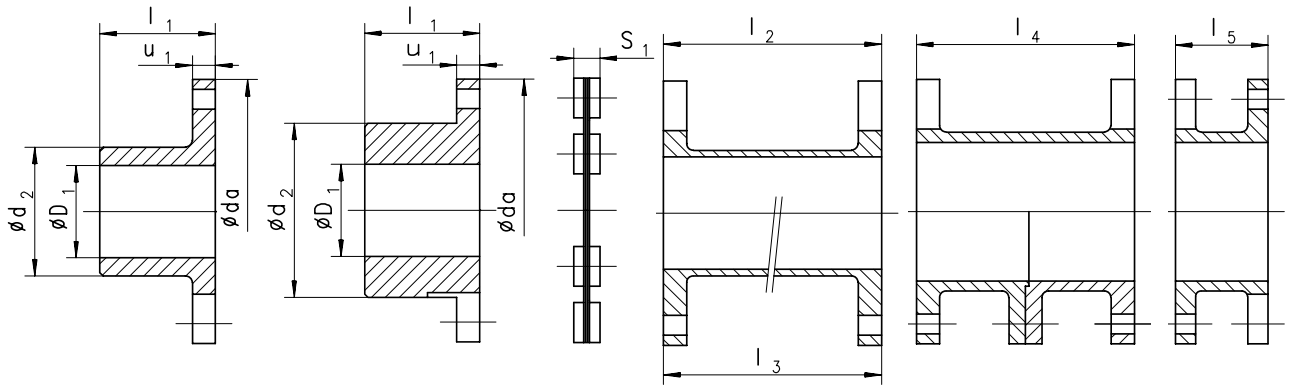
The nominal torques T_{KN} shown in the following lists are valid for:

- Continuous operation up to 24 h
- Shock loads of up to twice the nominal torque are allowed up to five times per hour on starting or during operation.
- Operation within the stipulated alignment
- Operation within a temperature range from -20 °C up to +280 °C (ambient temperature resp. shaft end temperatures)

Attention ! **In order to ensure continuous, trouble-free operation, the coupling has to be selected with a service factor, adequate to the application. In case of changes in operating conditions (power rating, speed, changes on driver or driven machine) re-examination of the design is urgently necessary.**

1.1 Dimensions of ARPEX components

N-hub J-hub Plate pack A-spacer E-spacer O-spacer



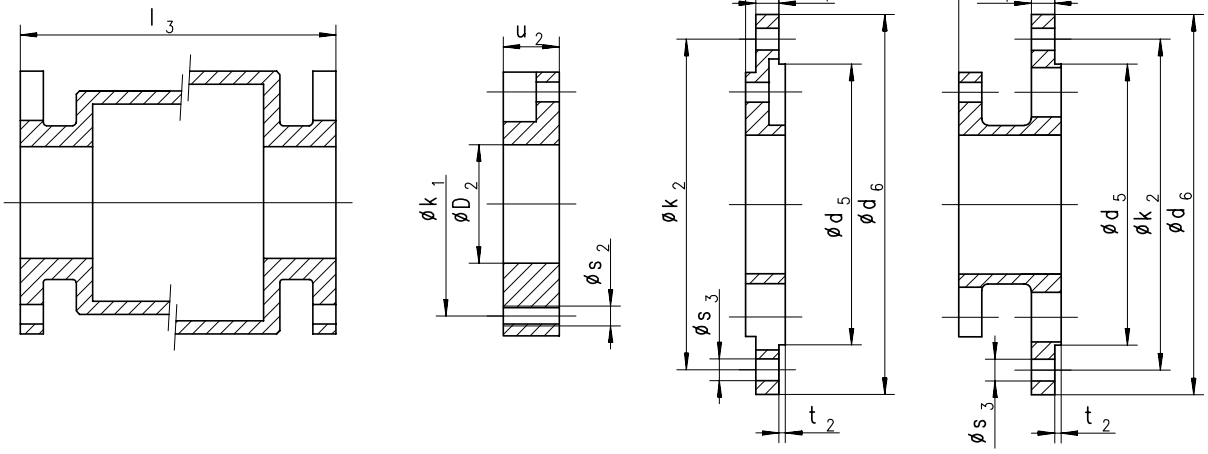
B-hub H-spacer U-spacer

ARPEX-Coupling da Size	Nominal Torque T_{KN} Nm	Speed n_{max} rpm	N-hub D_1 max. mm	N-hub d_2 mm	B-hub D_1 max. mm	B-hub d_2 mm	Jumbo-hub D_1 max. mm	Jumbo-hub d_2 mm	D_2 H^7 mm	d_a mm	d_5 mm	Tol. d_5	d_6 mm	k_1 mm	k_2 mm
78	170	13400	28	39	28	39	40	53	40	78	90	j6	125	66	110
105	270	10000	45	63	45	63	60	80	60	105	120	j6	155	93	140
125	490	8400	55	76	55	76	70	92	75	125	140	j6	178	109	160
140	700	7500	65	91	65	91	80	107	90	140	155	j6	194	124	175
165	1250	6350	75	105	75	105	92	124	95	165	180	j6	232	145	210
175	2000	6000	80	110	80	110	96	130	105	175	190	j6	245	153	220
195	3000	5350	90	120	90	120	106	142	115	195	215	j6	270	169	245
210	4400	5000	95	126	95	126	110	149	120	210	230	j6	300	180	270
240	5700	4350	110	145	110	145	130	173	140	240	260	m6	330	207	300
255	7600	4100	115	154	115	154	135	182	150	255	275	m6	345	219	315
280	10000	3750	135	184	120	161	--	--	160	280	305	m6	375	240	345
305	12000	3400	145	198	130	175	--	--	180	305	330	m6	400	260	370
335	18000	3100	160	214	140	190	--	--	190	335	365	m6	447	285	410
372	24000	2800	165	225	145	200	--	--	200	372	410	m6	505	310	460
407	34000	2550	185	250	145	205	--	--	210	407	445	m6	535	340	490
442	43000	2350	200	270	170	230	--	--	230	442	490	m6	585	370	540
487	55000	2150	225	305	180	250	--	--	260	487	535	m6	645	410	590
522	69000	2000	240	325	200	275	--	--	280	522	580	m6	695	440	640
572	92000	1800	265	360	220	300	--	--	310	572	625	m6	770	480	700
602	106000	1700	280	380	225	310	--	--	320	602	655	m6	800	505	730
667	120000	1550	305	430	245	345	--	--	350	667	725	m6	870	565	800
722	150000	1450	335	470	280	395	--	--	380	722	780	m6	945	610	875

Table 1.1.1: Torques T_{KN}, speed n_{max}., dimensions of ARPEX components

Z-spacer C-flange F-flange D-flange

Design A Design B



ARPEX-Coupling da Size	l_1 mm	l_2 mm	l_3 mm	l_4 mm	l_5 mm	s_1 mm	Thread. holes s_2 mm	Thread. holes no.	Clearance holes s_3 mm	Clearance holes no.	t_2 mm	u_1 mm	u_2 mm	u_3 mm	u_4 mm
78	30	84/124	acc. to customer's specification	39	35	8	M6	6	6,6	6	2	7	12	10	35
105	45	84/124/164		64	35	8	M6	6	6,6	6	2	7	12	10	35
125	55	78/118/158		74	45	11	M8	6	9	6	2	9	15	13	45
140	65	78/118/158 178/228		94	48	11	M8	6	9	6	2	9	15	13	45
165	75	72/112/152/ 172/222		108	55	14	M10	6	11	6	2	9	17	15	55
175	80	70/110/150/ 170/220		112	65	15	M12	6	14	6	2	12	21	19	65
195	80	70/110/150/ 170/220		112	65	15	M14	6	14	8	2	12	22	20	65
210	90	110/150/ 170/220		130	75	15	M16	6	18	6	2	13	24	22	75
240	100	104/144/ 164/214		140	80	18	M18	6	18	8	2	15	28	26	80
255	110	134/154/204		148	100	23	M20	6	18	8	2	18	32	30	100
280	130	130/150/200		182	100	25	M22	6	18	10	3	19	34	31	100
305	140	146/196		196	120	27	M24	6	18	12	3	20	40	37	120
335	150	-		206	125	30	M27	6	22	10	3	22	44	41	125
372	160	-		216	145	32	M30	6	22	12	3	25	49	46	145
407	175	-		236	150	35	M33	6	22	16	3	27	51	48	150
442	190	-		256	165	38	M36	6	22	18	3	30	58	55	165
487	215	-		294	175	41	M39	6	26	16	3	33	63	60	175
522	230	-		312	190	44	M42	6	26	18	4	36	67	63	190
572	255	-		352	200	47	M45	6	33	16	4	38	71	67	200
602	270	-		370	215	50	M48	6	33	16	4	41	76	72	215
667	305	-		426	230	55	M52	6	33	18	4	43	81	77	230
722	335	-		470	245	60	M56	6	39	16	4	46	86	82	245

Table 1.1.2: Dimensions of ARPEX components

1.2 Weights of ARPEX components

Size	Weight									
	N-hub	B-hub for D1 max.	J-hub	Plate pack	A-spacer		H-spacer		Z-spacer Design A	
da					l2		l3 = 1000 mm	per 100 mm	l3 = 1000 mm	per 100 mm
mm	kg	kg	kg	kg	mm	kg	kg	kg	kg	kg
78	0,3	0,3	0,3	0,11	84	0,5	3,5	0,3	4,7	0,4
					124	0,7				
105	0,8	0,8	0,9	0,13	84	0,9	4,8	0,4	9,9	0,8
					124	1,1				
					164	1,3				
125	1,4	1,4	1,5	0,31	78	1,5	6,9	0,6	14,2	1,2
					118	1,8				
					158	2,0				
140	2,1	2,1	2,4	0,33	78	1,8	7,8	0,6	20,7	1,9
					118	2,1				
					158	2,3				
					178	2,5				
					228	2,8				
165	3,2	3,2	3,7	0,65	72	2,4	10,2	0,8	29,7	2,6
					112	2,7				
					152	3,1				
					172	3,2				
					222	3,7				
175	3,9	3,9	4,5	0,90	70	3,3	14,4	1,2	35,4	3,1
					110	3,8				
					150	4,3				
					170	4,5				
					220	5,1				
195	4,5	4,5	5,4	1,23	70	4,5	20,9	1,8	34,6	2,8
					110	5,2				
					150	5,9				
					170	6,2				
					220	7,1				
210	5,6	5,6	6,9	1,75	110	6,1	22,8	1,9	37,1	3,0
					150	6,8				
					170	7,2				
					220	8,2				
240	8,2	8,2	9,9	2,47	104	8,3	28,0	2,2	41,4	3,3
					144	9,2				
					164	9,6				
					214	10,7				
255	10,7	10,7	12,6	3,54	134	11,6	34,1	2,6	52,2	3,7
					154	12,1				
					204	13,4				
280	16,5	14,1	--	4,43	130	14,5	41,6	3,1	63,0	4,2
					150	15,1				
					200	16,7				
305	20,7	17,9	--	6,22	146	18,4	51,7	3,9	77,8	4,6
					196	20,3				
335	25,4	23,3	--	8,24	--	--	68,3	5,1	83,6	4,7
372	33,1	30,4	--	12,76	--	--	86,9	6,3	--	--
407	43,2	38,8	--	15,98	--	--	107,0	8,1	--	--
442	55,2	48,5	--	20,66	--	--	134,2	10,1	--	--
487	78,0	67,9	--	19,97	--	--	166,4	12,1	--	--
522	95,1	84,2	--	23,65	--	--	186,6	13,2	--	--
572	127,7	109,0	--	31,02	--	--	235,7	16,6	--	--
602	150,8	128,9	--	37,12	--	--	275,7	18,9	--	--
667	225,2	180,9	--	46,88	--	--	325,7	21,0	--	--
722	288,4	242,7	--	63,47	--	--	372,9	23,8	--	--

Table 1.1.3: Weights of ARPEX components

Size da mm	Weight							
	Z-spacer Design B		E-spacer	U-spacer	O-spacer	C-flange	F-flange	D-flange
	l3 = 1000 mm kg	per 100 mm kg	kg	kg	kg	kg	kg	kg
78	7,1	0,6	0,4	--	0,3	0,2	0,7	0,8
105	13,6	1,2	0,7	--	0,6	0,4	1,1	1,2
125	20,9	1,9	1,1	--	1,0	0,7	1,8	1,9
140	28,7	2,6	1,4	2,35	1,2	0,8	2,0	2,2
165	34,5	2,8	2,0	3,40	1,6	1,4	3,3	3,2
175	36,9	3,0	2,8	4,70	2,4	1,8	4,5	4,7
195	41,2	3,3	3,5	5,79	3,0	2,4	5,6	5,6
210	41,3	3,3	4,8	7,70	4,0	3,1	7,6	7,7
240	48,3	3,7	7,1	10,90	6,0	4,6	10,6	10,7
255	59,4	4,2	9,0	14,10	8,1	5,7	13,2	13,9
280	71,9	4,7	12,6	19,00	10,4	7,6	17,1	17,9
305	108,2	7,8	15,9	23,30	13,5	9,8	21,3	21,9
335	122,3	8,5	21,1	32,00	17,9	13,5	29,9	29,7
372	--	--	30,7	45,60	27,0	19,0	42,9	44,0
407	--	--	41,3	62,20	35,8	25,2	51,9	54,4
442	--	--	51,0	77,40	44,5	33,0	70,0	69,0
487	--	--	72,6	103,70	61,5	43,4	91,6	94,3
522	--	--	85,4	133,80	73,3	51,4	114,4	116,5
572	--	--	114,0	169,80	95,1	66,6	146,6	152,7
602	--	--	137,8	227,00	116,3	81,1	171,5	180,8
667	--	--	181,8	287,20	151,2	112,4	220,7	227,6
722	--	--	216,6	332,10	177,5	138,0	276,4	275,5

Table 1.1.4: Weights of ARPEX components

2. General information

2.1 General

These operating instructions should always be kept accessible near the coupling.

Only exact knowledge of the operating instructions ensures trouble-free coupling operation. Therefore, it is in the interest of our customers that these instructions are read, understood and in all aspects observed by personnel responsible for transport, assembly and operation.

Note: We cannot be held responsible for damages and operating hold-ups, resulting from failure to comply with the operating instructions.

The "coupling" dealt with in these instructions, has been designed for stationary applications in general mechanical engineering.

Possible applications for couplings of this series are e.g. waste water treatment, dredgers, chemical industry, printing machines, iron and steel industry, conveyors, hoisting equipment, food industry, paper machines, pumps, cable railways, ventilators, compressors, cement industry etc.

The coupling is designed only for the application range stated in section 1 "Technical data". Deviating operating conditions necessitate a new contractual agreement.

The coupling described herein, corresponds to the state of technology at the time of going to press.

In the interest of further development, whilst maintaining the essential characteristics, we reserve the right to make changes, which are deemed to increase its capacity and safety.

Please refer all technical queries to the factory

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or to one of our service centers. A list of centers can be found in section 11 "Stocking of spare parts, addresses of service centres"

3. Safety information

3.1 Safety notes for the user

- The coupling has been designed according to the state of technology and is supplied in a safe to operate condition. Unauthorized modification, which interfere with the operational safety are not permitted. This applies also to guarding devices, which have been put up against unintentional contact.

- The coupling is to be installed and operated only within the scope of conditions laid down in the supply contract.

- The customer has to ensure that all personnel engaged in assembly, operation, care and maintenance, have read and understood these operating instructions and that they strictly observe all points to:

  - avert danger to life and limb of users and third parties,

  - safeguard the operational safety of the coupling

    and

  - exclude downtime and environmental damage through wrong handling.

- The relevant regulations and instructions concerning health and safety at work, and environment protection have to be observed for transport, assembly and disassembly, operation and maintenance.

- The coupling is to be operated and maintained only by authorised and trained personnel.

- All work has to be carried out carefully and from the point of view of "safety".

- Any work on the coupling has to be carried out whilst it is at rest. The driver is to be safeguarded against unintentional starting (e.g. by locking the key switch or removing fuses in the mains supply). A notice should be placed at the start-up location which says that work is being carried out on the coupling.

- The driver is to be switched off at once, if, during operation, any changes such as changed running noise, can be noticed on the coupling.

- The coupling is to be protected by appropriate protecting guards against accidental touching.

- When the coupling is incorporated in machines or equipment, the manufacturer of the machine or equipment is obliged to include all instructions, notes and descriptions of these operating instructions in his operating instructions.

3.1.1 Marking of safety notes in the operating instructions

Any important instructions which refer to safety and operational protection, have been marked by:

This symbol points to safety measures, which must be followed to avoid **personal injuries**.

Attention ! This symbol refers to safety measures which must be observed to avoid **damage to the coupling**.

Note! This note refers to **general operating instructions**, which should be specially noted.

4. Transport and storage

4.1 Extent of supply

The extend of supply is listed on the transport documents. Its completeness should be checked on delivery. Possible transport damage and/or missing parts should be reported immediately in writing. After consultation with Messrs. Flender an expert should be called in.

4.2 Transport

Subject to transport route and size, the coupling is packed differently. If not specially agreed in the contract, the packing corresponds to guide lines HPE. Symbols on the packaging should be noted. They have the following meaning:

Top | Fragile | Keep dry | Sensitive to heat | Centre of gravity | Do not use hook | Secure here

Attention ! **Make sure to use suitable lifting gear.**

4.3 Storage

4.3.1 Storage of coupling parts

The coupling is supplied with a protective coating and can be stored for up to 6 months, indoors at a dry location. In case longer storage is intended, a corresponding long-term conservation is necessary (refer to FLENDER).

4.3.2 Storage of plate packs

4.3.2.1 General information

Properly stored plate packs remain unchanged in their characteristics. Storage under unfavourable conditions and improper handling will have a negative influence and a change of physical properties will result. These changes can come about through reaction to oxygen, ozone, extreme temperatures or damp.

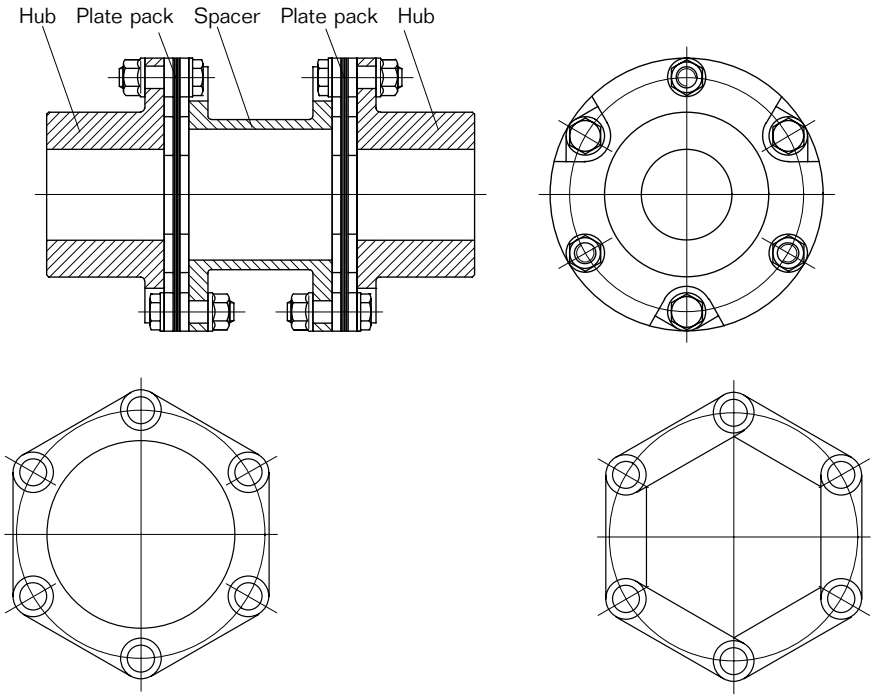
4.3.2.2 Store

The storage place should be dry and dust-free. The plate packs are not to be stored together with corrosive chemicals, acids, alcaline solutions etc.

Attention ! **Damp storage places (relative humidity above 65%) are unsuitable. Care should be taken that no condensation develops.**

5. Technical specification

5.1 General description



Ring plate pack **Hexagon plate pack**

ARPEX couplings are all steel couplings. The plate packs are placed between flanges of coupling parts and spacer and alternately bolted with them.

Individual thin steel plates are assembled on bushings and are pressed tightly together by an inserted, internally bevelled, retaining ring. The retaining ring is fastened by the expanded end of the bushing, which fits snugly against it. As all joints are built-up like this, the plate pack forms a compact unit.

By this arrangement of plate packs, the ARPEX coupling is torsionally stiff and torque is transmitted without backlash.

ARPEX couplings of standard series size 78 to 255 have ring-plate packs, sizes 280 up to 722 are supplied with hexagon plate packs (see illustration). Collar bolts with collar nuts connect plate packs with spacer- and coupling part flanges.

By virtue of the modular design concept, ARPEX couplings can be assembled almost at random.

The size identification of the coupling is on the outside diameter (da) of coupling flange in mm. This identification is complemented by a preceding combination of letters, which specify the coupling components.

Example: ARS-6 NEN 255
Coupling with two N-hubs (N) and one E-spacer (E) size 255
of series ARS-6

6. Assembly

6.1 Information on machining finish bores, axial safeguarding, set screws, balancing

6.1.1 Finish bores

- Remove rust preventive coating from coupling parts.

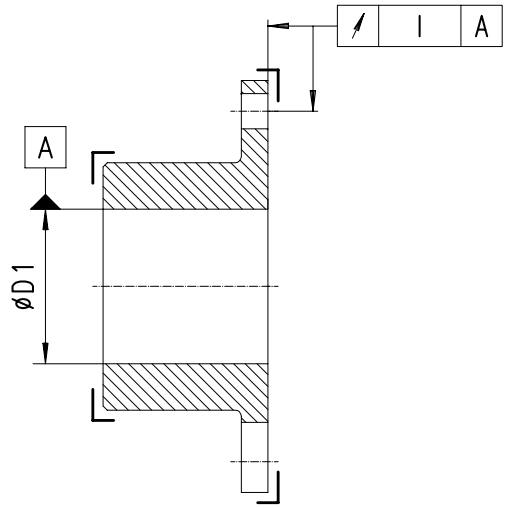
Observe manufacturer's instructions regarding handling of solvents.

In order to machine finish bores components have to be carefully aligned. Limits for concentric and offset mislignment are listed in table 6.1. Parts have to be held at the planes marked thus (□).

Attention ! **The max. permissible bore diameters apply to drive type fastenings without taper action according to DIN 6885/1 and must not be exceeded under any circumstances.**

If instead of the planned drive type fastening other shaft- hub connections (e.g. splined hub profiles, tapered or stepped bores, stressed type fastenings with taper action) are to be used, consult FLENDER.

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!



Size	N-hub Bore D1max. mm	B-hub Bore D1max. mm	J-hub Bore D1max. mm	Concentr. l mm	Size	N-hub Bore D1max. mm	B-hub Bore D1max. mm	Concentr. l mm
78	28	28	40	0,030	**305**	145	130	0,052
105	45	45	60	0,035	**335**	160	140	0,057
125	55	55	70	0,040	**372**	165	145	0,057
140	65	65	80	0,040	**407**	185	145	0,063
165	75	75	92	0,040	**442**	200	170	0,063
175	80	80	96	0,040	**487**	225	180	0,063
195	90	90	106	0,046	**522**	240	200	0,070
210	95	95	110	0,046	**572**	265	220	0,070
240	110	110	130	0,046	**602**	280	225	0,070
255	115	115	135	0,052	**667**	305	245	0,080
280	135	120	--	0,052	**722**	335	280	0,080

Table 6.1: Permissible radial and offset misalignment

For drive connections by keys, the following combination of fits are specified:

Type of fit	Shaft limits	Bore limits	
		Reversing operation	One-direction operation
Interference fit with keyway	h6	P7	N7
	k6	M7	H7
	m6	K7	H7
	n6	J7	H7
	p6	H7	F7
Shrink fit	Customer´s specification	on request	on request

Table 6.2. Combination of fits

Attention !

Observation of fit combinations is necessary, on the one hand, in order to keep the clearance in the shaft hub connection as low as possible, depending on utilization of the tolerance bands and, on the other hand, to limit hub stressing arising due to the interference within the permissible levels. Non-compliance may endanger the shaft-hub connection.

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

6.1.1.1 Keyways

Keyways have to be machined to suit the existing keys. For keyways, the tolerance band of hub keyway width ISO P9 has to be kept to.

6.1.2 Axial safeguarding

A setscrew or endplate can be used for axial safeguarding of coupling parts. If end plates are to be used, contact FLENDER with regard to the recessing of coupling parts.

6.1.3 Setscrews

To avoid damaging the shaft, the setscrew bore should be machined over the keyway.

Hubs of size 78 however, should have the setscrew located at 180° to the keyway.

Size	max. Thread mm	Size	max. Thread mm
78	M5	**305**	M20
105	M6	**335**	M20
125	M6	**372**	M20
140	M8	**407**	M24
165	M10	**442**	M24
175	M10	**487**	M24
195	M12	**522**	M24
210	M12	**572**	M24
240	M12	**602**	M24
255	M12	**667**	M24
280	M16	**722**	M24

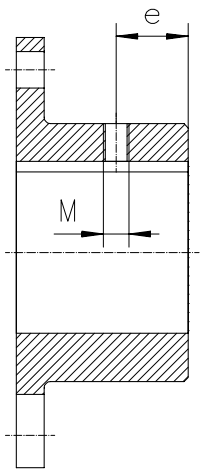


Table 6.3: Setscrew allocation

The following guide lines should be observed!

The setscrews are to be located at the centre of the hub core, as shown in above illustration. If this is not practical, please note that the clearance distance **(e)** to the set screw is to be at least M x 1,5.

Hexagon socket set screws with cup point according to DIN 916 should be used.

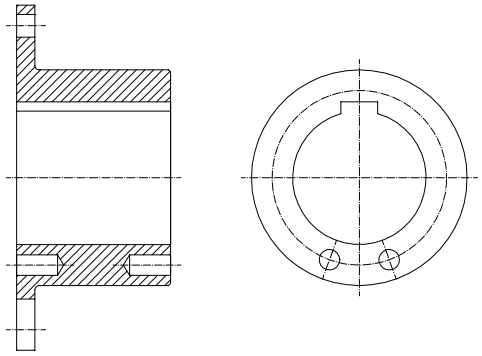
The set screw length should fill the threaded hole but not project above the hub (L min = M x 1,2)

6.1.4 Balancing

Rough drilled couplings resp. rough-drilled coupling parts are supplied in an unbalanced condition. For these components it is recommended that they are balanced, subject to their intended use, after finish boring (for this purpose, we refer to DIN 740, DIN ISO 1940 part 1).

Balancing is usually achieved by removing metal through drilling. In order to limit the material to be removed to a minimum, a rather large equalizing radius should be chosen.

Finish bored couplings or coupling parts are supplied in a balanced state according to customer's specification.



Arrangement of balancing holes in case of hubs with keyway
when balancing in one plane.

6.2 General information on assembly

When assembling , the **safety instructions** of section 3 should be observed.

Assembly is to be carried out with great care by skilled fitters.

Care should be taken, already at the planning stage, that adequate space is available for assembly and subsequent maintenance work.

Adequate lifting gear should be on hand at the start of assembly.

Under no circumstances can any sort of welding work be allowed on the coupling or coupling parts, as this will have a negative influence on the mechanical properties of the coupling.

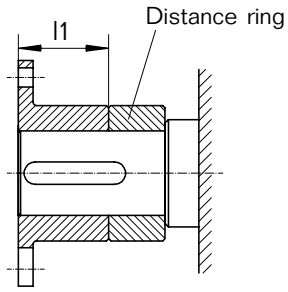
Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

6.3 Mounting of coupling parts (shaft-hub connection with key)

Prior to starting, finish bores and surfaces for spacer rings and nuts resp. close fitting bolts (subject to assembly procedure, see sect. 6.12) have to be thoroughly cleaned and rust protection removed. The same applies to shaftends.

Observe manufacturer's instructions regarding handling of solvents.

Attention ! **The coupling parts have to be mounted using suitable equipment, so as to avoid damaging any shaft bearings through axial mounting force. Use suitable lifting gear.**



Shaft ends should not protrude over hub inside faces. If necessary, place spacers or distance rings to bridge the gap between coupling and shaft shoulder. Axial safeguarding by setscrew or endplate.

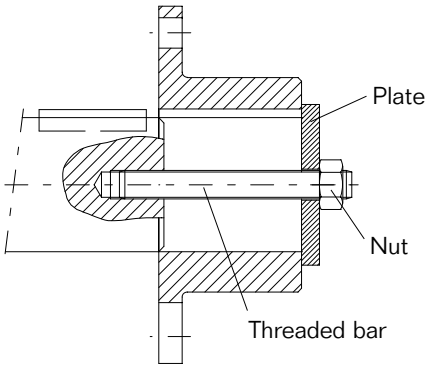
Attention ! **Tighten setscrews only with hex. key according to DIN 911, without extention pipe.**

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

For hubs with key connection it is recommended to warm the coupling hubs to max. 150 °C, this will facilitate mounting.

Take care not to get burned by hot components.

A mounting device will ease fitting hubs with transition fits and heated hubs on the lightly oiled shaft end.



Bar is threaded into shaft end; size of thread depends on available shaftdiameter. Put a plate of appropriate size over the threaded bar. By tightening the nut the hub moves onto the shaft.

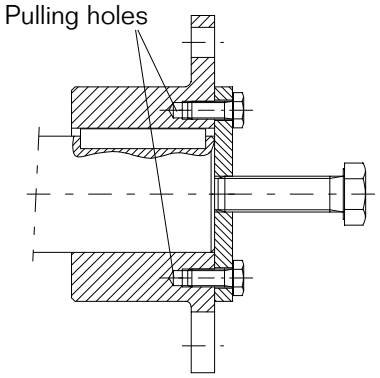
6.4 Disassembly of shaft-hub connection with key

To pull a coupling hub from the shaft, the plate packs have to be disassembled first. Then remove the endplate if applicable resp. loosen setscrew. With the aid of a three-armed puller resp. by placing a pulling device in the threaded holes (only in existence if demanded), remove the hub from the shaft.

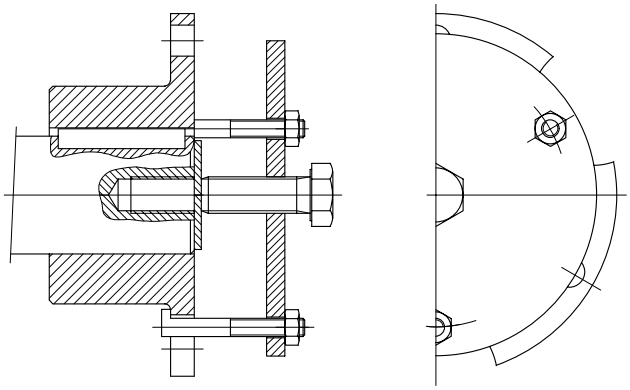
In case of a tight fit, warm the hub uniformly with a burner and carefully pull the hub with a pulling device from the shaft.

Take care not to get burned by hot components!

Check disassembled components carefully before reuse or return them, if necessary, to FLENDER for repairs.



Hub with pulling holes



Three-arm puller
(cannot be used on J-hubs)

6.5 Shrink connections

6.5.1 Assembly

Cylindrical shrink connections are joined by heating the outer part. To avoid premature binding, joining should be carried out speedily in a draught-free space.

Attention should be paid to a short transport distance!

6.5.1.1 Mounting aids

- Hot air oven or ring burner
- Crane with rapid lowering facility (for vertical shaft)
- Cleaning agents, solvents, brushes, rags

6.5.1.2 Preparation for shrinking

- Parts should be visually checked
  Particularly noting the following points:

a) chamfer on shaft and hub bore
b) shrink fit surfaces without any damage
c) undamaged threaded connections for hydraulic implements.

- Remove preserving coat from parts to be joined with solvent

Observe manufacturer's instructions regarding handling of solvents.

- Check penetrability of oil channels and lengths of threads of thread connections.

- Heat hub uniformly to the specified temperature.

Take care not to get burned by hot components!

6.5.1.3 Shrinking process

- Preferred shaft position, if possible, is vertical.
- Locate heated hub without tilt, taking note of the leading-in chamfer.
- Lower hub without interruption down to the shoulder, taking care that no tilting occurs.
- Leave parts to cool slowly to room temperature, parts can stressed after approx. 24 hours.

Take care not to get burned by hot components!

6.5.2 Disassembly of shrink connections

To disassemble a coupling hub with a cylindrical shrink fit, the plate packs and the spacer have to be disassembled first.

When disassembling in cold surroundings, the shrink connection should be slightly warmed up.

6.5.2.1 Ungraded shaft end

Depending on the length of the coupling hubs, there are one or more oil grooves. The oil must be pressed into the shrink fit with the aid of one or more pumps, subject to the number of oil grooves. The axial movement is realized with the help of a separate hydraulic press or mechanical puller.

6.5.2.2 Graded shaft end

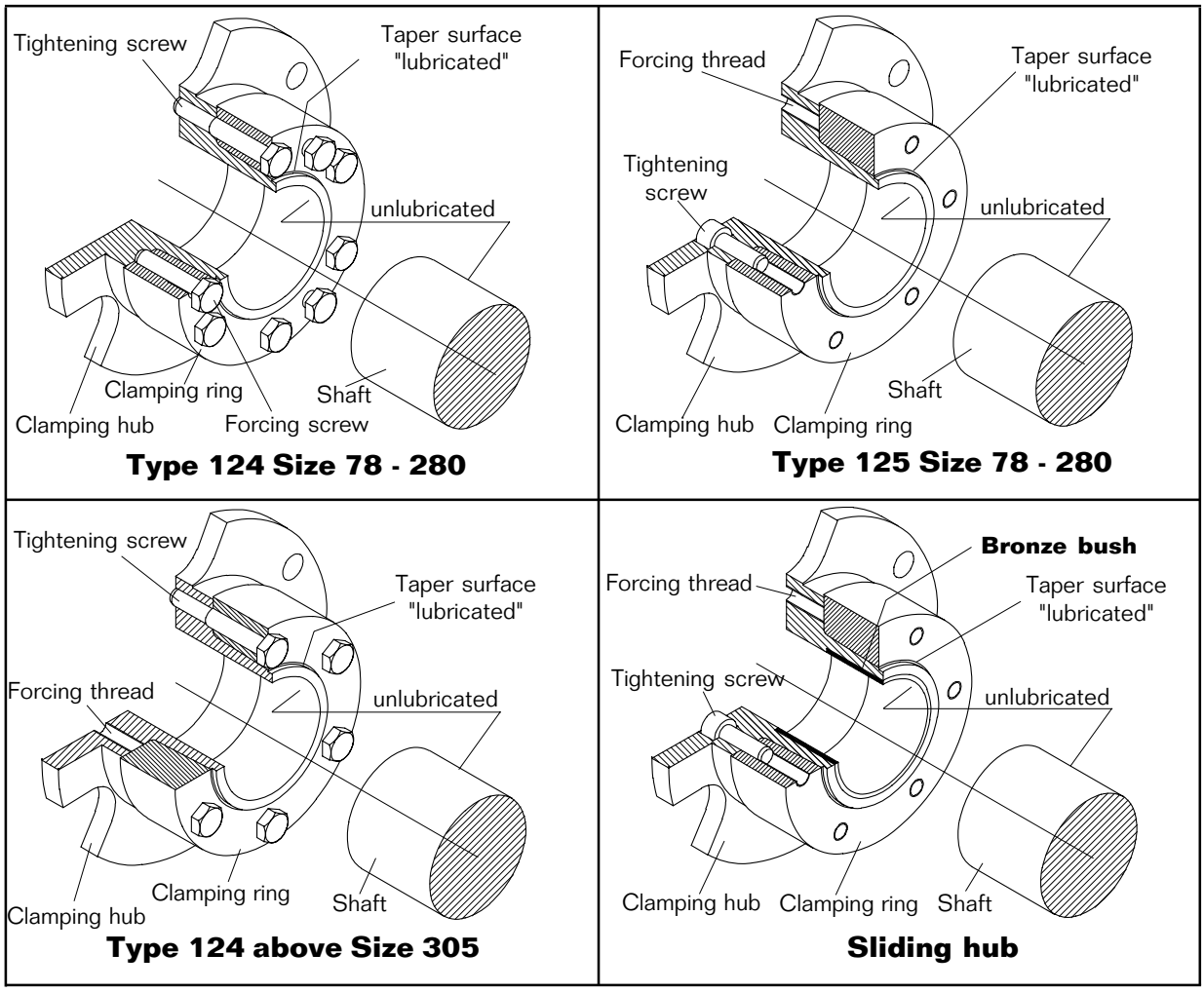
The coupling hubs are furnished with at least one oil groove. A motor driven pump must be installed at the transition from the smaller to the bigger diameter of the shaft, due to the large amount of oil which is needed in a short time. A hand-operated pump is sufficient for all other oil connections. The axial movement is caused by the pressure effect at the grade.

6.5.2.3 Viscosity of pressure oil

Under normal temperature conditions thin-bodied, pure mineral oil with a viscosity of 6 to 10°E at 50°C serves best as pressure oil.

However, should oil escape in masses, so that the pressure cannot be held on disassembly, the use of more heavy-bodied oil is possible.

6.6 Clamping hub connection (type 124/125 and sliding hubs)



6.6.1 Preliminary remarks

Power transmission of ARPEX-clamping and sliding hubs is by frictional engagement. ARPEX sliding hubs are supplied with the specified torque adjusted, it is for this reason, that they should not be disassembled. Clamping hubs are shipped in assembled condition, ready for mounting.

6.6.2 Assembly

Note the following procedure on assembly:

a) Degrease shaft and hub bore.

Observe manufacturer's instructions regarding handling of solvents.

b) Loosen clamping screws slightly and pull clamping ring just a fraction off the hub, so that the clamping ring is loose.

c) Push hub on shaft.

d) Tighten clamping screws evenly one after the other. Several turns must be made, until the clamping ring fits snugly and evenly on the flange of the clamping hub. The clamp connection is ready for use, when the tightening torque for clamping screws, listed in table 6.4, has been reached and the clamping ring sits close against the hub flange.

Attention ! **Non-observance of these recommendations can impair the function of the clamping- resp. sliding hub.**

Tightening torque - clamping screws Quality class 10.9 (μ 0,14)					
Thread	**TA [Nm]**	**Thread**	**TA [Nm]**	**Thread**	**TA [Nm]**
M5	7,0	M12	100,0	M20	480,0
M6	12,0	M14	160,0	M24	840,0
M8	30,0	M16	250,0		
M10	60,0	M18	350,0		

Table 6.4: Tightening torques of screws for clamping hubs

6.6.3 Disassembly

Procedure for disassembly of clamping hubs:

6.6.3.1 Clamping hubs size 78 to 280 and sliding hubs

a) Loosen clamping screws evenly one after the other. Each screw should only be loosened by half a revolution per rotation. Free all clamping screws by 3-4 threads.

b1) Clamping hub "124"
Loosen clamping ring with the aid of forcing screws, located in the clamping ring. Before mounting the clamping ring again, screw back the forcing screws to their original position.

b2) Clamping hub "Type 125" and sliding hub
Loosen the clamping ring by tightening screws in the forcing threads of the hub flange (see type 125). Before mounting the clamping ring again, remove screws.

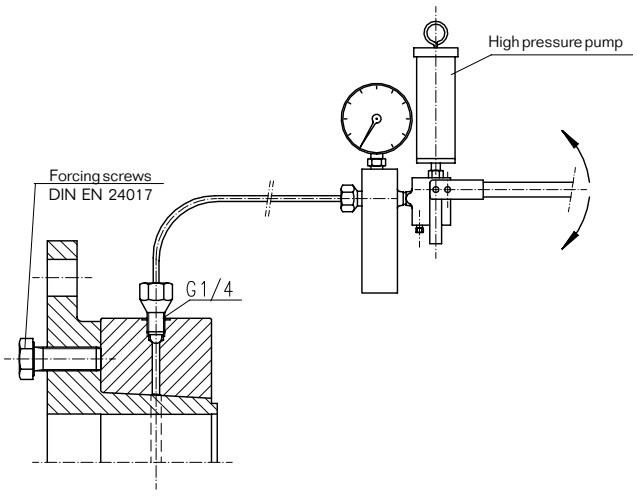
6.6.3.2 Clamping hubs from size 305 up

a) Loosen clamping screws evenly one after the other. Each screw should only be loosened by half a revolution per rotation. Free all clamping screws by 3-4 threads.

b) In case the clamping ring does not automatically come loose from the hub, additional forcing screws, depending on number of threaded holes (subject to size of coupling), have to be used on the ARPEX flange and evenly tightened, until the clamping ring comes loose.

c) If this procedure is not successfull, oil has to be forced into the parting line between clamping ring and hub by high pressure pump; to remove thus the self blocking of the clamping ring. For this purpose the high pressure hose of the pump is connected via the G 1/4" connecting thread on the outside diameter with the clamping ring.

Before retightening the clamping ring remove the forcing screws and close the G 1/4" threaded hole with the plug, supplied as part of the shipment.



Attention ! **Non-observance of these recommendations can impair the function of the clamping resp. sliding hub.**

6.6.4 Cleaning and lubrication

If the clamping ring has been removed hydraulically, then the taper surfaces **have to be** cleaned to remove the hydraulic oil and greased again with **Altemp Q NB 50** (Messrs. Klüber).

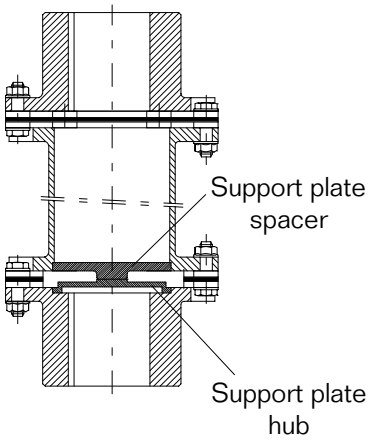
Observe manufacturer's instructions regarding handling of solvents.

Otherwise the dismounted clamping hub connection does not have to be further disassembled and regreased before retightening. But in case the cone faces are to be greased again, the above named lubricant should be used.

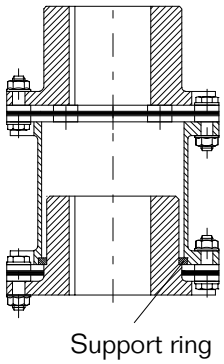
6.7 V-supports

Plate packs of ARPEX couplings are axially flexible and thus cannot support the weight of a spacer in a vertical application. Support plates are optionally available, which direct the spacer weight as an axial thrust force to the machine bearing, without straining the plate pack.
For applications of this type, spacers and connecting pieces are fitted, fully functional, at the factory. The support plates are adapted and fitted to suit the coupling combination.

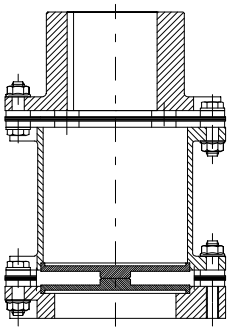
NHN with V-support



BEN with V-support



CEN with V-support



6.7.1 Assembly

When assembling a N-hub resp. B-hub, the factory fitted support plate has to be removed by unscrewing the three studscrews with an Allan key. The hub is then mounted on the shaft end as described in section 6.3. (In case of clamping hubs with V-support it is not necessary to remove the support plate!)

After mounting, reassemble the support plate in the hub, locate it properly and screw in the three studscrews. Take care that the support plate seating is flat.

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

Now the plate pack is positioned on the hub face and the spacer with the factory fitted support plate is located on the lower support plate; after this, the second plate pack and close fitting bolts are inserted and assembled (see section 6.12).

6.7.2 Disassembly

Remove spacer and plate packs in reverse order. Unscrew the three studscrews and with two forcing screws in the support plate, lift it out of the recess. When replacing plate packs, check the V-support plates and renew them if necessary.

6.8 U-spacers

ARPEX couplings series ARS-6 are optionally available with a U-spacer from size 140 up. The dimensions of U-spacers correspond with those of E-spacers, but can be parted in the centre.

6.8.1 Condition on delivery

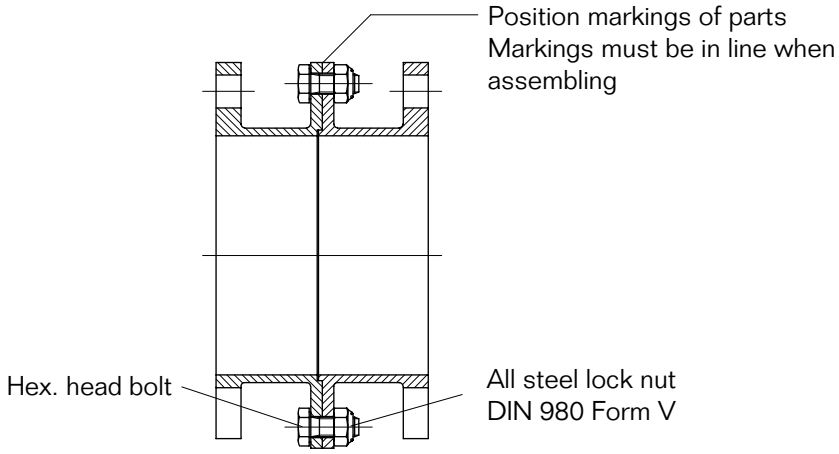
U-spacers are supplied in hand-screwed assembled condition.

6.8.2 Assembly

Before assembly clean the coupling parts carefully using a suitable cleaning agent.

Observe manufacturer's instructions regarding handling of solvents.

Internal and external recesses and contact surfaces of individual U-spacer components have to be checked for possible damage and reworked if necessary. Before inserting the bolts, look for possible balancing markings (sect. 6.10).
Tighten the bolts evenly one after the other with the specified torque (see table 6.5), being careful that the recess connection is not tilted.



Attention ! **Non-observance of these instructions can impair the proper function of the coupling.**

6.9 C-, D- and F-flange fastening

6.9.1 Condition on delivery

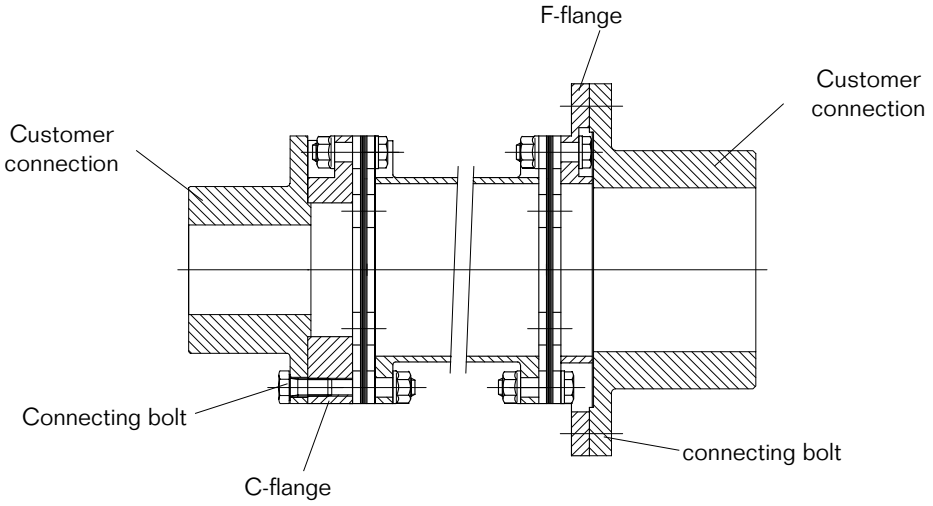
C-, D- or F- flanges are supplied, subject to agreement, as single parts or ready assembled with a spacer.

6.9.2 Assembly

Before assembling, clean coupling parts carefully with the help of a suitable solvent.

Observe manufacturer's instructions regarding handling of solvents.

- Check recesses and contact faces of C-, D- or F-flanges for possible damage and rework them if necessary.
- Take great care in making recess connections.
- The connecting bolts have to be tightened evenly one after the other with the specified torque (see table 6.5), being careful that the recess connection is not tilted.



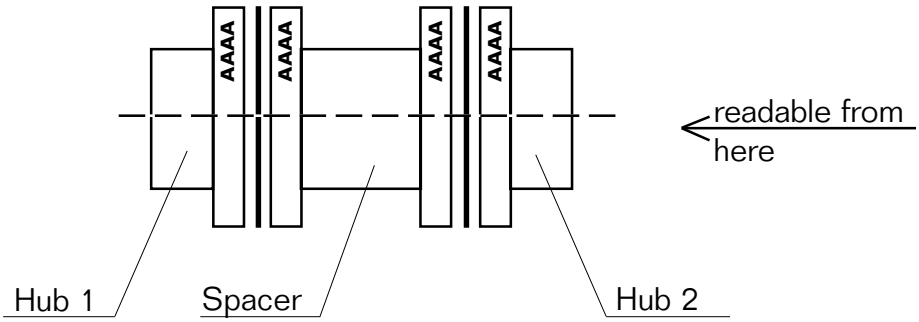
Attention ! **Non-observance of these instructions can impair the proper function of the coupling.**

Hex. bolt DIN EN 24017 / 8.8 (former DIN 933)	Tightening torque T_A
M6	9 Nm
M8	20 Nm
M10	41 Nm
M12	70 Nm
M14	110 Nm
M16	170 Nm
M18	235 Nm
M20	330 Nm
M22	450 Nm
M24	570 Nm
M27	840 Nm
M30	1140 Nm
M33	1550 Nm
M36	2000 Nm

Table 6.5: Tightening torques of connecting bolts

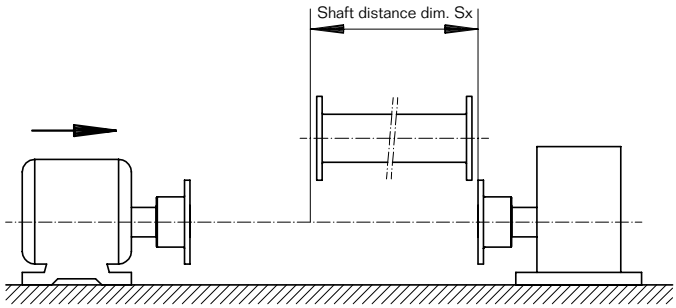
6.10 Assembly of summation balanced couplings

Couplings which are summation balanced, have a 4-digit number stamped on each component flange OD. Take care on assembly, that only coupling parts are bolted together which have the same numbers on their flange OD. The components have to be arranged so that numbers are in one line, to be readable from one direction (see illustration). Only this arrangement guarantees the requirements.



6.11 Assembly of the drive train

Move machines to be coupled to the specified shaft distance dimension.



Take care, danger of bruising!

6.12 Fitting the plate packs

6.12.1 Size 78 to 240 / Tightening torque method

Assembly of plate packs is carried out, depending on size, according to illustrations on page 28. On couplings furnished with O-spacers, F-flange and special designs with restricted space requirement, close fitting bolts can be assembled mirror inverted.

Plate packs have to be bolted to the coupling part, so that rings (item 1 - figure 1) are adjacent to ARPEX flange (item 2). The bolts must be used in the as-delivered condition, **additional lubrication or greasing of the bolts is not allowed!**

Application of the preloading force has to be from the nut side, whereby the bolt head should be secured against rotating. Tighten nuts one after the other with torques T_A listed in table 6.6 on page 29.

Example: Size **210**
Thread **M16** (thread in condition of delivery)
Tightening torque $\mathbf{T_A = 250\ Nm}$

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

6.12.2 Size 255 - 722 / Rotation angle method

6.12.2.1 Preparatory measures:

- Apply lubricant (ATEC special paste - Klüber Altemp Q NB 50) to the contact faces of the nut and the bolt head and the thread of the fitting bolt. This lubricant is included in the scope of a plate pack supply. Bolt the plate pack alternately together with the coupling components, so that the rings (item 1, Fig. 2, page 28) contact the ARPEX flange (item 2). Preferably tighten the nuts so that they contact the flange (Fig. 2). If this is impossible for space reasons, assembly the other way round is also possible.

- The tightening torque for the bolts must be applied to the nuts and the bolt head be secured against turning. This protection against turning must be supported on the flange to which the plate pack is fastened. Tighten the nuts as follows:

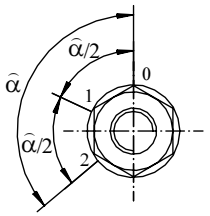
6.12.2.2 Pretensioning of fitting bolt

The following procedure is recommended:

- Tighten the nuts consecutively using torque $\mathbf{T_0}$ (see table 6.6 on page 29).

- Mark a clearly visible zero position at any point on the collar of the nut as well as on the flange (fig. II). It is recommended to choose a corner of the hexagon as zero position.

- Starting from the zero position mark the turning angle $\alpha/2$ and α [deg] respectively $\hat{\alpha}/2$ and $\hat{\alpha}$ [arc angle] - see table 6.6 on page 29 - in a counter-clockwise direction on the collar of the nut (fig. I).



Arc angle on the collar of the nut

Fig. I

Alternatively, the turning angle [deg] can also be transferred to the wrench socket, to avoid marking every single nut as described above. **Do not in any case mark the turning angle as arc angle according to table 6.6 - these values relate exclusively to the collar of the nut!**

- Turn the nuts consecutively, starting from the zero position (marked on the flange) to the first angle mark $\alpha/2$ (on the wrench socket or the collar of the nut) in the tightening direction.

- Then turn the nuts up to the second mark α in a second tightening operation.

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

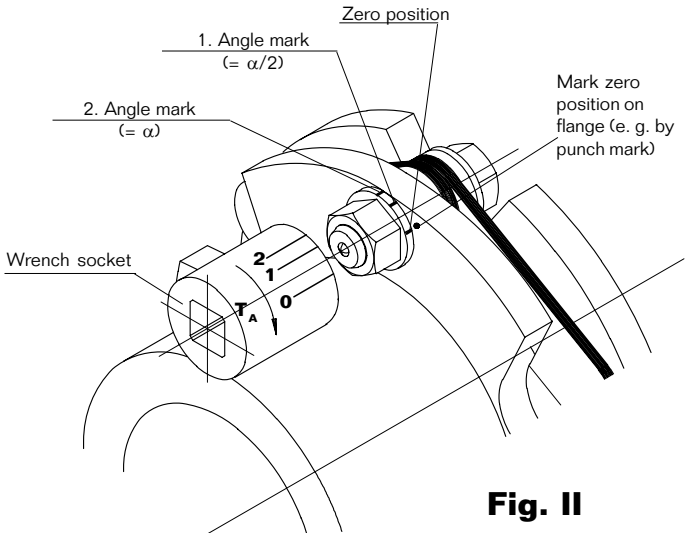


Fig. II

Example: Size **442** Thread **M36**
Thread greased with special paste
Tightening torque T_0 = **310 Nm**
Rotation angle α = **75 degrees**
Arc angle $\widehat{\alpha}$ = **46 mm**

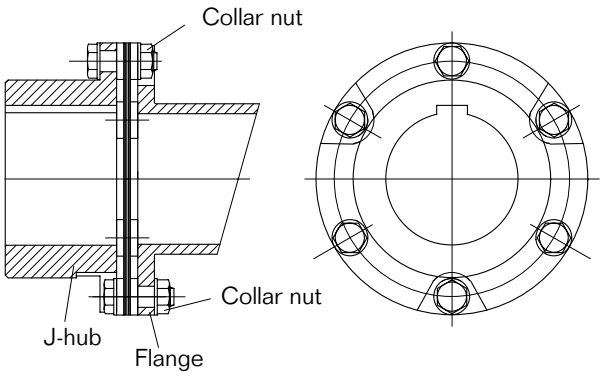
6.12.3 Jumbo-hub Size 78 - 255

In principle the same procedures apply as described under 6.12.1 resp. 6.12.2. In addition the following should be noted:

- The screws must be inserted from the side of the Jumbo hub, so that all nuts can be fastened from the side of the spacer.

- The tightening torque must be applied to the nuts and the bolt heads be secured against turning. For that purpose the bolt heads which are located

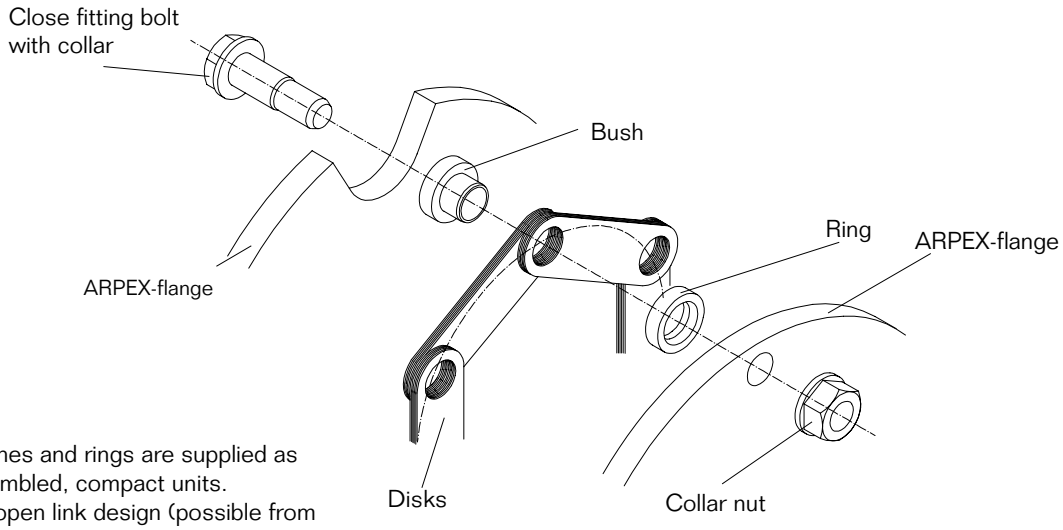
  - at the flange must be secured with an open-end wrench
  - in the recess of the flange at the plate pack must be secured with a box wrench.



Tighten the nuts one after the other as described under 6.12.1 resp. 6.12.2.

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

Design of an ARPEX bolting point



Note!
Disks, bushes and rings are supplied as ready assembled, compact units.
In case of open link design (possible from size 280 up) one bush and one ring is supplied loose. These must be inserted appropriately when assembling (see figure).

1.

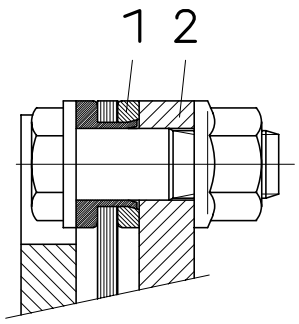


Plate pack sizes 78 - 255
(Ring plate pack, collar nut)

2.

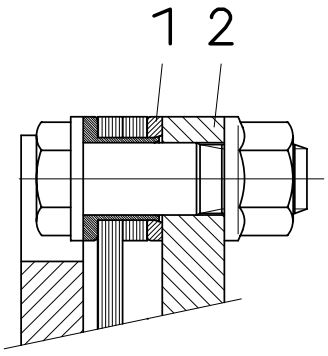
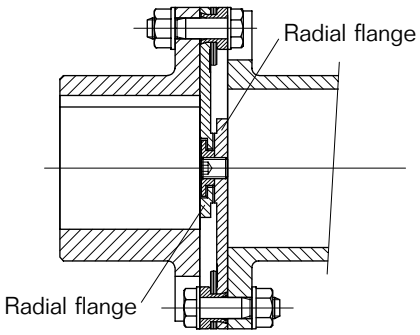


Plate pack sizes 280 - 722
(Hexagon plate pack, collar nut)

6.12.4 Plate packs with integral axial float limitation Size 78 - 722



Here, also, the same procedures apply as described under 6.12.1 or 6.12.2 resp.

In addition, the following should be noted:

The plate pack has to be fastened to the coupling parts such that the radial flange of the plate pack sits close to the flange of the coupling part, as otherwise the proper function of the coupling cannot be guaranteed.

Attention ! **Non-observance of these instructions can impair the proper function of the coupling.**

6.13 Technical data for plate pack assembly

ARPEX Size	Thread [mm]	A/F [mm]	Rotation angle method: Rotation angle T_0 [Nm]	Rotation angle α [Deg]	Rotation angle $\alpha/2$ [Deg]	Arc angle CollarØ [mm]	Arc angle $\hat{\alpha}$ [mm]	Arc angle $\hat{\alpha}_{/2}$ [mm]	Tightening Torque T_A [Nm]	Remarks
78	M6	10	--	--	--	--	--	--	12	Pretensioning by tightening torque T_A [Nm] Additional lubrication or greasing of the bolts is **not** allowed!
105										
125	M8	13	--	--	--	--	--	--	30	
140										
165	M10	17	--	--	--	--	--	--	60	
175	M12	19	--	--	--	--	--	--	100	
195	M14	21	--	--	--	--	--	--	160	
210	M16	24	--	--	--	--	--	--	250	
240	M18	27	--	--	--	--	--	--	350	
255	M20	30	50	50°	25°	36	16	8	--	Pretensioning by angle of rotation Threads and contact faces of nuts lubricated by special paste!
280	M22	32	70	55°	27,5°	40	19	10	--	
305	M24	36	90	50°	25°	45	20	10	--	
335	M27	41	120	55°	27,5°	50	24	12	--	
372	M30	46	170	50°	25°	60	26	13	--	
407	M33	50	240	70°	35°	65	40	20	--	
442	M36	55	310	75°	37,5°	70	46	23	--	
487	M39	60	400	80°	40°	75	52	26	--	
522	M42	65	500	85°	42,5°	80	59	30	--	
572	M45	70	630	90°	45°	90	71	35	--	
602	M48	75	770	95°	47,5°	95	79	39	--	
667	M52	80	950	75°	37,5°	100	65	33	--	
722	M56	85	1200	85°	42,5°	110	82	41	--	

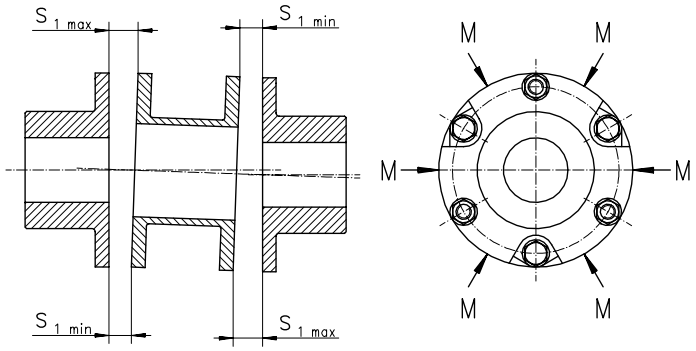
Table 6.6: Assembly values for plate pack fastening

6.14 Alignment

The couplings can compensate for misalignment of shafts to be connected up to the data listed in 6.15. The radial and angular misalignments of shaft ends is to be kept as small as possible.

Couplings featuring two plate packs can accomodate axial, radial and angular misalignments. Couplings with only one plate pack, accept just angular and axial misalignment.

On aligning machine parts, use a caliper gauge to measure gap S1 (see illustration) between coupling flanges at several measuring points. If the measured flange gaps are within the value range $S1_{min}$ $S1_{max}$ (see table 6.7), then the alignment is sufficiently good.



S1 = Gap of coupling flanges
$S1_{min}$ = see table
$S1_{max}$ = see table
M = Measuring point

Attention ! **The assembly misalignment values must not exceed values for $S1_{min}$ and $S1_{max}$ (table 6.7). In order to have misalignment reserves for the operating process, it is advisable to align the couplings such that the assembly misalignment is smaller than stated below (see also sect. 6.15).**

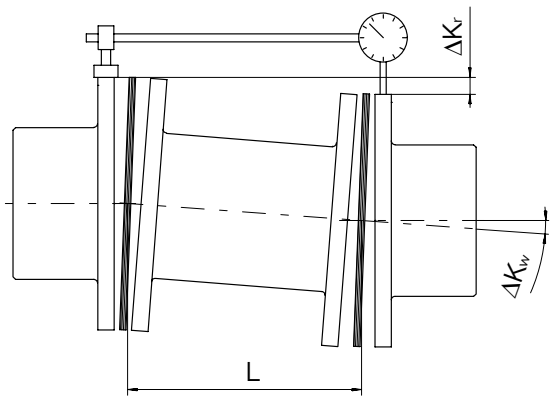
Size	S1 min. mm	S1 max. mm	Size	S1 min. mm	S1 max. mm
78	7,8	8,2	**305**	26,3	27,7
105	7,8	8,2	**335**	29,2	30,8
125	10,7	11,3	**372**	31,2	32,8
140	10,7	11,3	**407**	34,1	35,9
165	13,6	14,4	**442**	37,0	39,0
175	14,5	15,5	**487**	39,9	42,1
195	14,5	15,5	**522**	42,8	45,2
210	14,5	15,5	**572**	45,7	48,3
240	17,4	18,6	**602**	48,6	51,4
255	22,4	23,6	**667**	53,4	56,6
280	24,3	25,7	**722**	58,3	61,7

Table 6.7: Permissible assembly misalignment

6.15 Possible misalignments

Misalignments of coupling parts relative to each other can occur from inaccurate alignment on installation or can be caused by operating factors (heat extension, shaft bending, machine frame too weak etc.).

Radial misalignment ΔKr / Angular misalignment ΔKw



Axial misalignment ΔKa

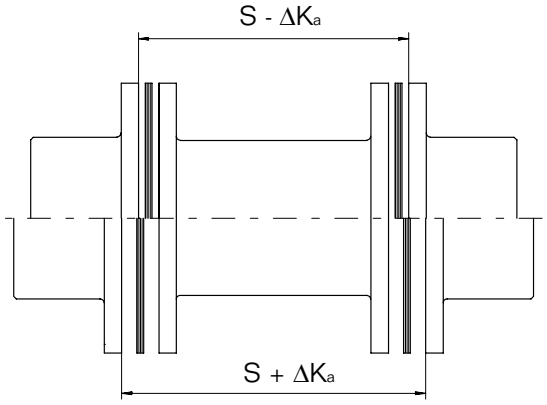


Table 6.8 lists perm. misalignments in angular and at the same time, axial direction, whereby values for axial misalignment refer to 1 plate pack.

The listed values are the total allowable misalignments which are allowed to occur during operation; misalignments which occurs during the assembly process must be considered appropriately.

Permissable radial misalignment depends on the allowable angular misalignment and on centre distance of plate packs.

$$\Delta Kr = \tan \Delta Kw \times L$$

L = centre distance of plate packs
L = S8 - S1

Example for finding the permissible misalignment:

Required:
Perm. misalignment values for an ARPEX coupling type ARS-6 NHN 195 with a shaft distance of S8 = 1000 mm.

a) Allow. angular misalignment = 0,7° at ΔKa = 0 mm
Allow. axial offset = ± 3,06 mm (2 plate packs = 2 x 1,53 mm) at ΔKw = 0°

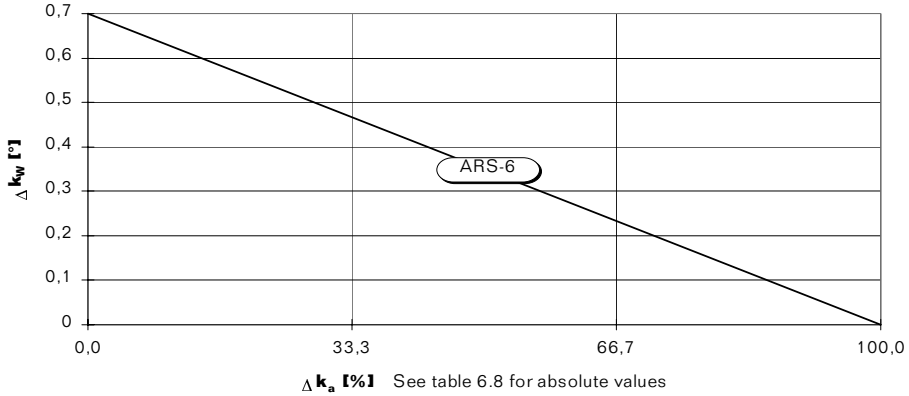
b) Allow. axial misalignment at ΔKw = 0,3° = ± 1,76 mm (2 plate packs = 2 x 0,88 mm)

The corresponding allow. radial misalignment at an angular misalignment of 0.3° is calculated as follows:

Centre distance of plate packs L = S8 - S1
= 1000 mm - 15 mm = 985 mm

ΔK_r = tan (0,3°) x 985 mm = 5,15 mm

6.15.1 Perm. total misalignment, subject to axial- and angular misalignment.



Attention ! **The following max. permissible misalignment values must not, under any circumstances, be exceeded during operation.**

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

6.15.2 Axial- /angular misalignment

The listed axial misalignment must be understood as permissible tolerance values according to the S1-value (see table 1.1.2).

Size [mm]	Permissible axial misalignment ΔKa [$\pm$ mm]							
78	0,55	0,47	0,39	0,31	0,24	0,16	0,08	0,00
105	0,90	0,77	0,65	0,52	0,39	0,26	0,13	0,00
125	1,01	0,86	0,72	0,58	0,43	0,29	0,14	0,00
140	1,20	1,03	0,86	0,69	0,52	0,34	0,17	0,00
165	1,37	1,18	0,98	0,79	0,59	0,39	0,20	0,00
175	1,43	1,22	1,02	0,82	0,61	0,41	0,20	0,00
195	1,53	1,31	1,09	0,88	0,66	0,44	0,22	0,00
210	1,57	1,35	1,12	0,90	0,67	0,45	0,22	0,00
240	1,85	1,58	1,32	1,05	0,79	0,53	0,26	0,00
255	1,92	1,65	1,37	1,10	0,82	0,55	0,27	0,00
280	2,09	1,80	1,50	1,20	0,90	0,60	0,30	0,00
305	2,23	1,91	1,59	1,27	0,95	0,64	0,32	0,00
335	2,42	2,08	1,73	1,38	1,04	0,69	0,35	0,00
372	2,49	2,13	1,78	1,42	1,07	0,71	0,36	0,00
407	2,75	2,36	1,96	1,57	1,18	0,79	0,39	0,00
442	3,01	2,58	2,15	1,72	1,29	0,86	0,43	0,00
487	3,40	2,92	2,43	1,95	1,46	0,97	0,49	0,00
522	3,67	3,14	2,62	2,09	1,57	1,05	0,52	0,00
572	3,93	3,37	2,81	2,24	1,68	1,12	0,56	0,00
602	4,12	3,54	2,95	2,36	1,77	1,18	0,59	0,00
667	4,78	4,10	3,41	2,73	2,05	1,37	0,68	0,00
722	5,11	4,38	3,65	2,92	2,19	1,46	0,73	0,00
	0,0°	**0,1°**	**0,2°**	**0,3°**	**0,4°**	**0,5°**	**0,6°**	**0,7°**
	Permissible angular misalignment [°] ΔKw							

Values are valid for 1 plate pack!

Table 6.8: Permissible axial and angular misalignment

7. Putting into service

7.1 Before operating

Check all bolt connections and retighten them if necessary. Alignment and gap dimension S1 should also be checked and corrected if necessary (see table 6.7 and 6.8). **Then mount the coupling guard, protection against unintentional contact.**

Disregarding these notes can cause damage to the coupling. Flying metal fragments can cause serious personal injuries!

8. Operation

8.1 General operating data

During operation, pay attention to

- changing running noises
- suddenly occurring vibrations.

Attention ! **In case any irregularities are noticed during operation, the drive must be stopped at once. Determine the cause of trouble with the aid of the trouble-shooting check list (sect. 9) which features possible sources, their causes and proposals to eliminate them. In case, the cause cannot be found resp. if there is no possibility to remedy the trouble with own resources, we recommend calling for a service engineer from one of our service depots (sect. 11).**

9. Failures, causes and remedies

9.1 General

The following listed failures can only be clues in the search for any cause of faults.

In complex drive situations, all other components have to be included in the search.

During all operating phases, the coupling should run with low noise and without vibration. Different operating behaviour should be seen as a fault, which has to be remedied promptly.

Before beginning any maintenance activities, repairs or other work, the operator has to ensure that the complete drive has stopped. The driver has to be secured against unintentional starting; otherwise we refer to the particular health and safety requirements for the installation.

9.2 Possible failures

Failure	Possible cause	Remedy
Sudden change in noise level and/or suddenly occuring vibrations	Change in alignment	Stop drive Remedy reason for change in alignment (e.g. tighten loose foundation bolts) Check for wear; proceed as described in sect. 10
	Broken plate pack, transmission of torque by close fitting bolts	Stop drive Disassemble coupling and remove remainder of plate pack Check coupling components and replace damaged parts Check alignment and correct it, if necessary (see section 6)

Table 9.1 : Possible failures

10. Maintenance

10.1 General

ARPEX couplings should be visually checked corresponding to the maintenance schedules of the plant, but at least once a year. Special attention is to be paid to the condition of the plate packs. Should individual plates or whole strands be broken, then the particular plate pack has to be replaced; in these cases, check also the coupling flanges for damage.

Any further maintenance work is not necessary.

10.2 Replacing plate packs

Original ARPEX plate packs should only be used as replacement, to guarantee proper torque transmission and trouble-free function.

Note! As a rule, replacing plate packs is possible without the necessity to shift coupled drive members. Exceptions are combinations with B-hubs and special designs.

For reassembly, carefully note instructions of section 6 “Assembly” and section 7 “Putting into service”.

11. Stocking of spare parts, addresses of service centres

Storage of important spare and wearing parts at the site is an essential requirement for operational availability of the coupling.

When ordering spare parts, the following data has to be given:

Number of pieces, name of parts, size (provided it is available, state also DRG. no. and position of spare part on the spare parts list.)

If coupling parts are required with finish bore and balanced, specify the following:

Finish bore, fit, keyway and balancing quality

Example of an order: 1 pc. ARPEX hub, series ARS-6, size 255 with bore 70 H7 and keyway to DIN 6885-1, single part dynamically balanced - after keyseating - G 2.5, speed 1000 rpm

1pc. ARPEX plate pack, series ARS-6, size 255 complete.

We can only guarantee original spare parts supplied by us.

Attention ! **We expressly draw client's attention to the fact that spare parts and accessories not supplied by us, have not been checked and released by us. Their assembly and/or use can possibly alter design characteristics negatively and thereby impair the active and/or passive safety. FLENDER excludes any liability and guarantees for any damage which results from the use of non-original spare parts and accessories.**

Please note that for individual components special manufacturing and supply specifications frequently exist and that we always offer spare parts according to the state of technology and latest legal requirements.

11.1 Addresses of service centres

When requesting spare parts or service fitter, contact FLENDER first.

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